The "Notes" are not illustrated, the student, as with the "Guide," making the required drawings solely from the specimen in hand. The insects chosen are common forms, easily obtainable anywhere in the United States.

INSECT NOTES.

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It is hoped to present annually a few notes on Kansas insects, paying special attention to those of economic importance. As no such notes were presented last year, certain observations made in 1891 are included in the notes of this year.

WHEAT-STRAW WORM (*Isosoma tritici* Riley).

A considerable amount of injury to Kansas wheat accredited to the Hessian fly is really done by the wheat-straw worm. In 1891, this insect was reported from about one-fourth of the counties of the State, being especially prevalent in central and western Kansas. Adults issue in March and April from last year's wheat straws, either in stubble or volunteer or stack, and oviposit on the young winter wheat. The adults of this brood emerge in the latter part of May and early part of June. The eggs are laid in the now maturing wheat, and the larvæ pupate in the stubble or in the stack before winter. The larvæ usually lie just above the second node below the head. In a bunch of straws from Russell county, over 75 per cent. were infested. In these straws, 40 per cent. of the pupæ were found above the first node below the head, 50 per cent. above the second node, and 10 per cent. elsewhere. They lie in small, gnawed-out cells, and the heads are almost invariably directed up, *i. e.*, toward the head end of the straw. *Eupelmus allyni* proves an effective natural check to this pest, the parasitism being noticed in all examinations made. As but about 5 per cent. of the straw worm flies have wings, the pest does not spread rapidly, and local efforts in fighting it, by burning old stacks and stubble containing pupæ, in the winter or early spring, are very effective. A bulletin was issued by the department of entomology of the University, in February, this year, calling attention to the presence of this pest in the State, and recommending the burning of old straw stacks and stubble.

A NEW BIBIO (*Bibio tristis* n. s.)

A Bibionid fly appeared in large numbers in many Kansas wheat fields during the last week of April, this year. It was reported from seven western counties, viz., Geary, Saline, Lincoln, Ellsworth, Pratt, Rice, and Smith. Farmers in these counties were alarmed by the presence of swarms of these flies, though in no case was any special damage apparent in infested fields. The larvæ of the flies were found in large numbers in the soil of a Pratt county field on February 10. Some larvæ were found also in hotbeds in which various flowers were growing. Adults were first reported on April 17, and from then constantly until the end of the first week in May. A correspondent in Lincoln county noted that pupation began about April 20, the adult flies appearing by April 27.

The flies were very abundant wherever present, but no injury to the wheat could be positively traced to them. The fields most badly infested gave no signs of unusual injury. The larvæ of the Bibionid family are known to feed on the roots of various plants. The flies disappeared suddenly and simultaneously. With the *Bibios*, several Anthomyid species appeared in lesser numbers. *Sciara* sp. (?) was sent in from several fields with the *Bibios*.

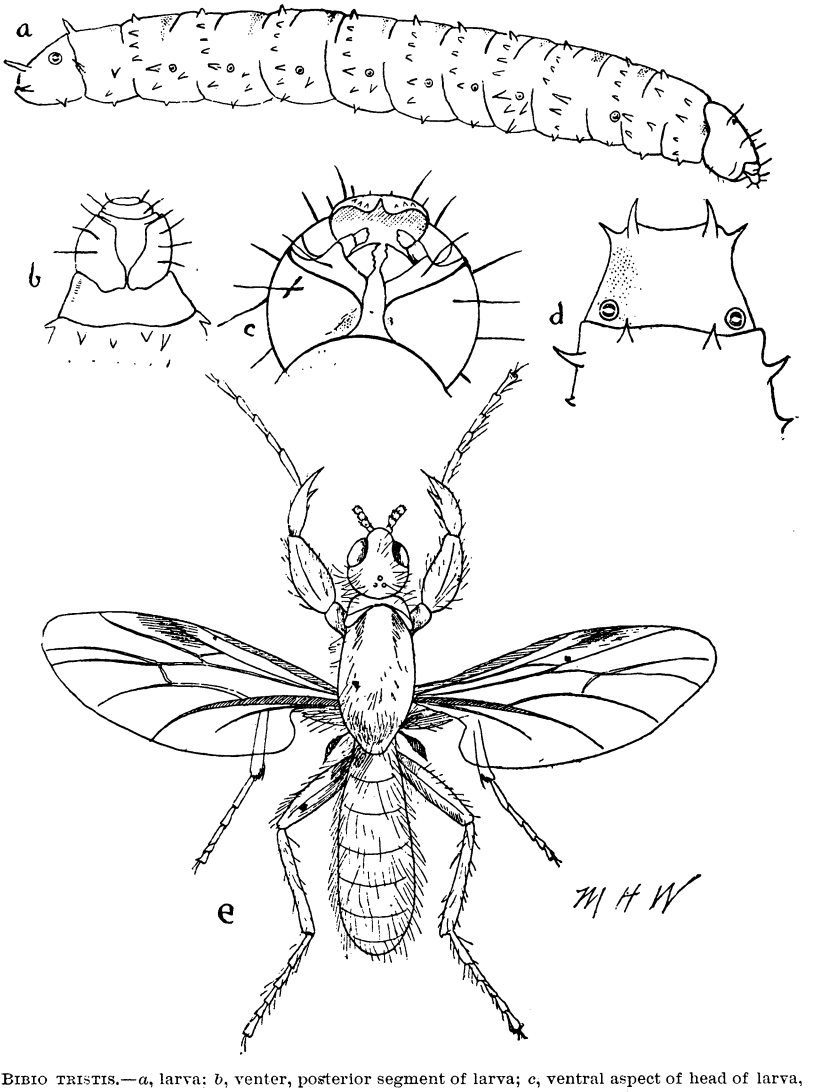
On examination, Dr. S. W. Williston finds this *Bibio* to be undescribed, and has kindly furnished the following description, proposing to name the species *tristis*.

BIBIO TRISTIS (n. s.)

Female.— Black, shining, legs red; spines of front tibiæ very unequal in size; wings dilutely subfuscous, the costal margin brownish; pile black. Length 00 mm.

Male.— Legs darker, mostly blackish.

Female.— Black, shining, the venter and the coxæ, save the front pair in part, of the same color. Pile black, somewhat whitish on the abdomen. Legs red or yel-



BIBIO TRISTIS.—*a*, larva: *b*, venter, posterior segment of larva; *c*, ventral aspect of head of larva, showing mouth parts; *d*, dorsum, posterior segment of larva; *e*, adult.

lowish-red, the knees, tip of tibiæ and tip of tarsi more or less blackish. Spines of the front tibiæ very unequal in size, those of the hind tibiæ small. Wings dilutely subfuscous, lighter posteriorly, the costal margin narrowly brownish, the anterior veins brown. Stigma brown.

Male.—Pile longer. Legs deep red, in large part blackish.

Kansas. The species is nearest allied to *B. obscurus* Loew and *B. xanthopus* Wied., but may be at once distinguished by the black pile.

The larvæ of the *Bibionidæ* differ from the most of dipterous larvæ in having well-developed mandibles and palpi, in place of the more common simple hooks. The larva of this species is about three-fourths of an inch long; general color dirty-whitish; surface of body finely punctuate; head dark brown; each segment with a single transverse line of six pointed projections on dorsum, and two transverse rows of six projections, beginning on pleura near the spiracle and extending across the venter. These projecting points assist in locomotion. There are no feet. Spiracles are present on the third to eleventh segments, counting the head as first segment. There are no spiracles on the twelfth segment. On the dorsum of the thirteenth (last) segment on either side there is a conspicuous dark eye-spot (spiracles?). In the plate herewith these anatomical details are shown.

WESTERN CORN ROOT WORM (*Diabrotica longicornis* Say).

The attacks of this pest in Kansas cornfields are too often not recognized, the results of the insect's work, *i. e.*, the stunting and falling over of cornstalks, being accredited to drowning or to drouth, or to lack of nourishment in the soil. The adult insect is a small, bluish-green beetle, which feeds largely on corn pollen. The "worm," or larva, does the real damage by burrowing into the tender growing roots of the corn, and, by destroying the roots, starving the corn plants. In badly-infested fields a strong wind will topple over many of these rootless plants.

This pest has been reported from many localities in Kansas during 1891 and 1892. Mr. S. J. Hunter, a student of entomology at the University, has compiled some interesting notes regarding the occurrence of this insect this summer in the neighborhood of his home, Greeley, Kas. A field of 30 acres, which has been in corn for six years consecutively, is damaged in spots all over. About 10 acres will not make more than one-third of a crop. Another field of 14 acres, which has been in corn for five consecutive years, is damaged one-third. Twenty acres of another 30-acre field show the presence of the insect, about 5 per cent. of the stalks being affected. A half-dozen or more other fields in this neighborhood are infested, all of which have been in corn for several consecutive years.

The remedy for this corn pest is easy and sure. As the insect larvæ, so far as known, can live on nothing but corn roots, a simple rotation of crops will starve them out in any given field.

HAM FLY (*Piophila casei* Linn.)

In August, 1891, complaint was made by one of the large packing houses of Kansas City, Mo., that a "skipper" was doing much damage to smoked meats. Specimens of larvæ and adults, soon after received from the packing company, showed the pest to be the well-known cheese-skipper fly; its occurrence in packing houses having been several times before recorded. The amount of injury reported by the Kansas City packing house was surprisingly large, though only smoked meats were attacked. Shipments of bacons and hams were often returned by consignees because of the "skippery" condition of the meats. As much as $1,500 worth of spoiled meats were returned within one week.

In February, 1892, I received a large number of larvæ, and kept them in breeding

jars. The breeding-cage notes show that the egg state is about four days, the larvæ state about two weeks, and the pupal state one week. The adult flies lived in the breeding jars from six days to two weeks after issuance from the puparia. Larvæ kept with ham and bacon did not take at all kindly to cheese, to which they were removed, although the fly is undoubtedly identical with the cheese-skipper fly.

The hams in the packing houses are smoked in a long shaft; adjoining the shaft are large rooms, into which the smoked hams are removed, and there inclosed in the cloth sacks. In these smoky rooms, and in the smoke-filled shaft itself, the adult flies swarm and lay their eggs on the hams. The sacks are put on the egg-infested hams, and the meat shipped. In the meanwhile the larvæ hatch, and the consumer removes the sack only to find a "skippery" ham. The problem is to prevent oviposition on the hams in the smoke shaft and in the bagging rooms. Measures recommended by Doctor Williston are now being tried, with what degree of success cannot yet be told.

THE FERMENTING FRUIT FLIES (*Drosophila* species).

Among some grapes of a small black variety, received from Mr. G. C. Brackett, secretary State Horticultural Society, several had broken skins, and the exposed juice was fermenting. In these fermenting grapes were to be found small dipterous larvæ, footless, and without other mouth parts than the hooks. They were about three-sixteenths of an inch in length when full-grown. Some of the infested grapes were isolated on October 1, and on the morning of the 4th the adult flies were obtained. They proved to be *Drosophila ampelophila* Loew, called by Doctor Williston the fermenting fruit fly, by Lintner the pickled-fruit fly, and by Comstock the vine-loving pomace fly. About 25 species of North American *Drosophilas* have been described, mostly by the late Doctor Loew and Mr. Walker of the British museum. They are all "fermenting" fruit flies, being attracted by any decomposing fruits. Doctor Williston has seen them in clouds about heaps of cider refuse. Doctor Lintner notes the occurrence of the species *ampelophila* in decaying peaches, and probably in sweet jam and sour pickles.

The flies are small, but brightly colored. The specimens bred from the Brackett grapes, species *ampelophila*, have bright red eyes, generally pale yellow bodies, with the last abdominal segment of the female and the last two of the male smoky black above. The wings are clear, being entirely unspotted. The flies are about one-tenth of an inch long.

The flies lay their eggs on or in the fermenting fruit, and the larvæ or maggots hatch in three or four days. The larvæ feed on the fermenting fruit about four days, and then change to the pupal state, which lasts about four days longer. The adult flies thus issue in about 12 days after the eggs are laid, and in their turn begin laying eggs in a couple of days after issuance. This fertility explains the large numbers of the flies.

The fermenting fruit flies should not be mistaken for the true apple-worm flies (*Trypeta pomonella* Walsh), the larvæ of which attack sound fruit, causing it to decay. The fermenting fruit flies attack only already unsound fruit. The adult fly of the apple worm is white and black, and its wings are distinctly banded. The apple-worm fly is also larger than the fermenting fruit fly, being about one-fourth of an inch in length.

Professor Comstock recommends inclosing the grape clusters in paper bags when the fermenting fruit flies are found in vineyards, as in Mr. Brackett's case. "A few pin holes should be made in the bottom of the bag, to allow the water to run out, which otherwise, in case of a storm, would collect and either rot the grapes or burst the bag."